

In the Claims

1. (currently amended) A composition comprising

A) a thermoplastic polymer and

B1) a triblock-copolymer of the formula B-C-B; or

B2) a graft copolymer wherein a polymer block B is grafted onto a polymer C to form a comb copolymer of idealized formula C-B(n) wherein n is greater than 2;

wherein

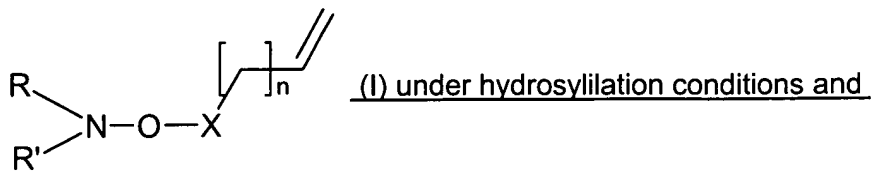
the polymer block B is compatible to the thermoplastic polymer A); and

the polymer block C is a polysiloxane which has a glass transition temperature of at least 20° K below the glass transition temperature of the thermoplastic polymer A);

and the average molecular weight M_w of the triblock-copolymer B1) or grafted comb copolymer B2) is below 50 000,

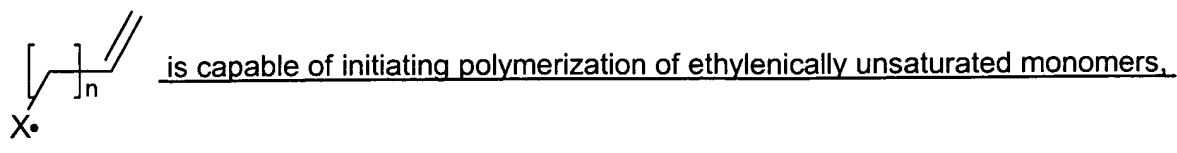
and wherein the triblock copolymer or the graft copolymer is prepared via controlled free radical polymerization comprising the steps

a) reacting a polysiloxane, in the presence of a functional alkoxyamine of formula (I)



b) reacting the resulting alkoxyamine terminated polysiloxane with an ethylenically unsaturated monomer at a temperature between 60 and 160° C, wherein

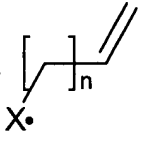
X represents a group having at least one carbon atom and is such that the free radical



n is a number from 0-18;

R and R' are independently tertiary bound C₄-C₂₈alkyl groups which are unsubstituted or substituted by one or more electron withdrawing groups or by phenyl; or

R and R' together form a 5 or 6 membered heterocyclic ring which is substituted at least by 4 C₁-C₄alkyl groups and which may be interrupted by a further nitrogen or oxygen atom

group having at least one carbon atom and is such that the free radical  is capable of

initiating polymerization of ethylenically unsaturated monomers.

n is a number from 0-18;

R and R' are independently tertiary bound C₄-C₂₈alkyl groups which are unsubstituted or substituted by one or more electron withdrawing groups or by phenyl; or

R and R' together form a 5 or 6 membered heterocyclic ring which is substituted at least by 4 C₁-C₄alkyl groups and which may be interrupted by a further nitrogen or oxygen atom.

2. (previously presented) A composition according to claim 1 wherein the thermoplastic polymer A is selected from the group consisting of polyethylene, polypropylene, polystyrene, polyacrylate, polymethacrylate, polyvinylchloride, polyphenyleneoxide, polyvinylacetate, polyamide and polyester.

3. (canceled)

4. (original) A composition according to claim 1 wherein the polymer block B is selected from the group consisting of polyisoprene, polybutadiene, polystyrene polymethacrylate and polyacrylate.

5. (currently amended) A composition according to claim 1 wherein the thermoplastic polymer A and the triblock-copolymer B-C-B are

polystyrene	polystyrene-poly-n-butylacrylate-polystyrene
polystyrene	polystyrene-polyisoprene-polystyrene
polystyrene	polystyrene-polybutadiene-polystyrene

polystyrene	polystyrene-polysiloxane-polystyrene,
polystyrene	polystyrene-polyethylacrylate-polystyrene[[,]]
polyethylene	polyisoprene-polysiloxane-polyisoprene,
polypropylene	polyisoprene-polysiloxane-polyisoprene,
polymethylmethacrylate	polymethylacrylate-polysiloxane-polymethylacrylate,
polyamide	polyethylacrylate-polysiloxane-polyethylacrylate,
polyester	polyethylacrylate-polysiloxane-polyethylacrylate,
polyvinylchloride	polyethylacrylate-polysiloxane-polyethylacrylate,
polyvinylchloride	poly-n-butylacrylate-polysiloxane-poly-n-butylacrylate,
polyphenyleneoxide	polystyrene-polysiloxane-polystyrene or
polyvinylacetate	polymethylacrylate-polysiloxane-polymethylacrylate.

6. (original) A composition according to claim 1 wherein the glass transition temperature of the polymer block C is 50° K below the glass transition temperature of the thermoplastic polymer A.

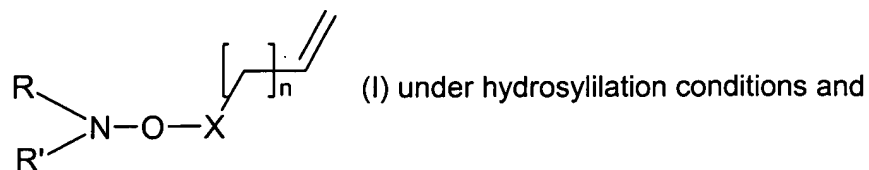
7. (original) A composition according to claim 1 wherein the average molecular weight M_w of the triblock-copolymer or graft-copolymer is below 30000.

8. (canceled)

9. (previously presented) A composition according to claim 1 wherein the triblock-copolymer or graft copolymer is present in an amount of from 0.1 to 10 % by weight, based on the weight of the thermoplastic polymer A).

10. (withdrawn) A process for the preparation of a triblock-copolymer or graft copolymer via controlled free radical polymerization comprising the steps of

a) reacting a polysiloxane, in the presence of a functional alkoxyamine of formula (I)



b) reacting the resulting alkoxyamine terminated polysiloxane with an ethylenically unsaturated monomer at a temperature between 60 and 160° C, wherein

X represents a group having at least one carbon atom and is such that the free radical

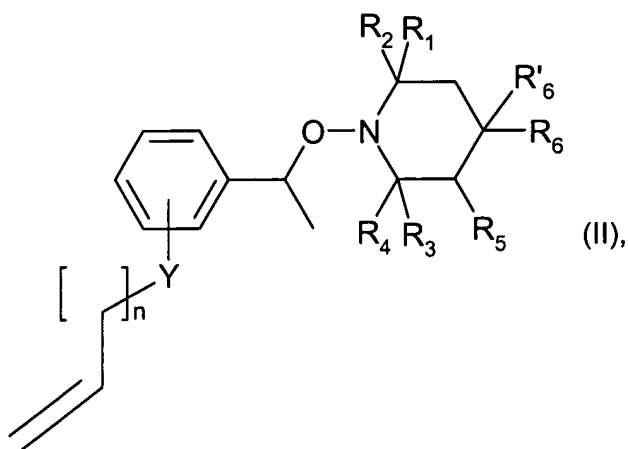


n is a number from 0-18;

R and R' are independently tertiary bound C₄-C₂₈alkyl groups which are unsubstituted or substituted by one or more electron withdrawing groups or by phenyl; or

R and R' together form a 5 or 6 membered heterocyclic ring which is substituted at least by 4 C₁-C₄alkyl groups and which may be interrupted by a further nitrogen or oxygen atom.

11. (withdrawn) A process according to claim 10 wherein the functional alkoxyamine is of formula (II)



wherein

Y is a direct bond, O, NH, C(O)O or S;

n is a number from 0-18.

R₁, R₂, R₃ and R₄ are independently of each other C₁-C₄alkyl;

R₅ is hydrogen or C₁-C₄alkyl;

R'₆ is hydrogen and R₆ is H, OR₁₀, NR₁₀R₁₁, -O-C(O)-R₁₀ or NR₁₁-C(O)-R₁₀;

R₁₀ and R₁₁ independently are hydrogen, C₁-C₁₈alkyl, C₂-C₁₈alkenyl, C₂-C₁₈alkinyl or C₂-C₁₈alkyl which is substituted by at least one hydroxy group or, if R₆ is NR₁₀R₁₁, taken together, form a C₂-C₁₂alkylene bridge or a C₂-C₁₂-alkylene bridge interrupted by at least one O atom; or

R₆ and R'₆ together are both hydrogen, a group =O or =N-O-R₂₀ wherein

R₂₀ is H, straight or branched C₁-C₁₈alkyl, C₃-C₁₈alkenyl or C₃-C₁₈alkinyl, which may be unsubstituted or substituted, by one or more OH, C₁-C₈alkoxy, carboxy, C₁-C₈alkoxycarbonyl;

C₅-C₁₂cycloalkyl or C₅-C₁₂cycloalkenyl;


phenyl, C₇-C₉phenylalkyl or naphthyl which may be unsubstituted or substituted by one or more C₁-C₈alkyl, halogen, OH, C₁-C₈alkoxy, carboxy, C₁-C₈alkoxycarbonyl;

-C(O)-C₁-C₃₆alkyl, or an acyl moiety of a α,β -unsaturated carboxylic acid having 3 to 5 carbon atoms or of an aromatic carboxylic acid having 7 to 15 carbon atoms;

-SO₃⁻Q⁺, -PO(O⁻Q⁺)₂, -P(O)(OR₂)₂, -SO₂-R₂, -CO-NH-R₂, -CONH₂, COOR₂, or Si(Me)₃, wherein Q⁺ is H⁺, ammonium or an alkali metal cation; or

R₆ and R'₆ are independently -O-C₁-C₁₂alkyl, -O-C₃-C₁₂alkenyl, -O-C₃-C₁₂alkinyl, -O-C₅-C₈cycloalkyl, -O-phenyl, -O-naphthyl, -O-C₇-C₉phenylalkyl; or

R₆ and R'₆ together form one of the bivalent groups -O-C(R₂₁)(R₂₂)-CH(R₂₃)-O-, -O-CH(R₂₁)-CH₂₂-C(R₂₂)(R₂₃)-O-, -O-CH(R₂₂)-CH₂-C(R₂₁)(R₂₃)-O-, -O-CH₂-C(R₂₁)(R₂₂)-CH(R₂₃)-O-, -O-o-phenylene-O-, -O-1,2-cyclohexyliden-O-,

-O--CH₂-CH=CH-CH₂-O- or  ; wherein

R₂₁ is hydrogen, C₁-C₁₂alkyl, COOH, COO-(C₁-C₁₂)alkyl or CH₂OR₂₄;

R₂₂ and R₂₃ are independently hydrogen, methyl ethyl, COOH or COO-(C₁-C₁₂)alkyl; and

R₂₄ is hydrogen, C₁-C₁₂alkyl, benzyl, or a monovalent acyl residue derived from an aliphatic, cycloaliphatic or aromatic monocarboxylic acid having up to 18 carbon atoms.

12. (withdrawn) A triblock-copolymer or graft copolymer obtained via a controlled free radical polymerization process according to claim 10.

13. (withdrawn) A composition comprising

A) a thermoplastic polymer and

B1) a triblock-copolymer of the formula B-C-B; or

B2) a graft copolymer wherein a polymer block B is grafted onto a polymer C to form a comb copolymer of idealized formula C-B(n) wherein n is greater than 2;

wherein

the polymer block B is compatible to the thermoplastic polymer A); and

the polymer block C has a glass transition temperature of at least 20° K below the glass transition temperature of the thermoplastic polymer A);

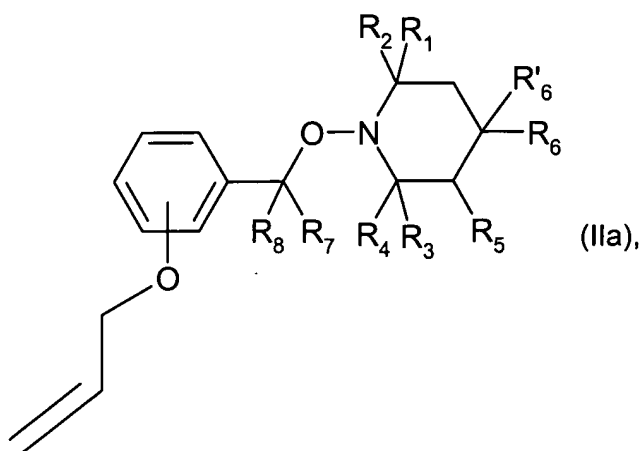
and the average molecular weight M_w of the triblock-copolymer B1) or grafted comb copolymer B2) is below 50 000,

wherein the triblock-copolymer or graft copolymer is prepared via controlled free radical polymerization according to claim 10.

14. (withdrawn) A process for enhancing the melt flow of a thermoplastic polymer during processing, which process comprises

adding a triblock-copolymer or graft copolymer according to claim 1 to a thermoplastic polymer and processing the polymer.

15. (withdrawn) A compound of formula IIa



wherein

R_1 , R_2 , R_3 and R_4 are independently of each other C_1 - C_4 alkyl;

R_5 is hydrogen or C_1 - C_4 alkyl;

R'_6 is hydrogen and R_6 is H, OR_{10} , $NR_{10}R_{11}$, $-O-C(O)-R_{10}$ or $NR_{11}-C(O)-R_{10}$;

R_{10} and R_{11} independently are hydrogen, C_1 - C_{18} alkyl, C_2 - C_{18} alkenyl, C_2 - C_{18} alkinyl or C_2 - C_{18} alkyl which is substituted by at least one hydroxy group or, if R_6 is $NR_{10}R_{11}$, taken together, form a C_2 - C_{12} alkylene bridge or a C_2 - C_{12} -alkylene bridge interrupted by at least one O atom; or

R_6 and R'_6 together are both hydrogen, a group $=O$ or $=N-O-R_{20}$ wherein

R_{20} is H, straight or branched C_1 - C_{18} alkyl, C_3 - C_{18} alkenyl or C_3 - C_{18} alkinyl, which may be unsubstituted or substituted, by one or more OH, C_1 - C_8 alkoxy, carboxy, C_1 - C_8 alkoxycarbonyl;

C_5 - C_{12} cycloalkyl or C_5 - C_{12} cycloalkenyl;

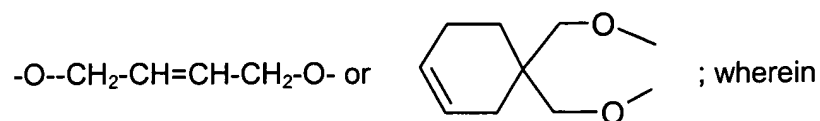
phenyl, C_7 - C_9 phenylalkyl or naphthyl which may be unsubstituted or substituted by one or more C_1 - C_8 alkyl, halogen, OH, C_1 - C_8 alkoxy, carboxy, C_1 - C_8 alkoxycarbonyl;

$-C(O)-C_1-C_{36}$ alkyl, or an acyl moiety of a α,β -unsaturated carboxylic acid having 3 to 5 carbon atoms or of an aromatic carboxylic acid having 7 to 15 carbon atoms;

$-SO_3^-Q^+$, $-PO(O^-Q^+)_2$, $-P(O)(OR_2)_2$, $-SO_2-R_2$, $-CO-NH-R_2$, $-CONH_2$, $COOR_2$, or $Si(Me)_3$, wherein Q^+ is H^+ , ammonium or an alkali metal cation; or

R_6 and R'_6 are independently $-O-C_1-C_{12}$ alkyl, $-O-C_3-C_{12}$ alkenyl, $-O-C_3-C_{12}$ alkinyl, $-O-C_5-C_8$ cycloalkyl, $-O$ -phenyl, $-O$ -naphthyl, $-O-C_7-C_9$ phenylalkyl; or

R_6 and R'_6 together form one of the bivalent groups $-O-C(R_{21})(R_{22})-CH(R_{23})-O-$, $-O-CH(R_{21})-CH_2-C(R_{22})(R_{23})-O-$, $-O-CH(R_{22})-CH_2-C(R_{21})(R_{23})-O-$, $-O-CH_2-C(R_{21})(R_{22})-CH(R_{23})-O-$, $-O$ -o-phenylene- $O-$, $-O$ -1,2-cyclohexyliden- $O-$,



R₂₁ is hydrogen, C₁-C₁₂alkyl, COOH, COO-(C₁-C₁₂)alkyl or CH₂OR₂₄;

R₂₂ and R₂₃ are independently hydrogen, methyl ethyl, COOH or COO-(C₁-C₁₂)alkyl;

R₂₄ is hydrogen, C₁-C₁₂alkyl, benzyl, or a monovalent acyl residue derived from an aliphatic, cycloaliphatic or aromatic monocarboxylic acid having up to 18 carbon atoms; and

R₇ and R₈ are independently hydrogen or C₁-C₁₈alkyl.